Correlation of JCNERR/BBNEP live broadcast content to National Science Education Standards

Grades K-4

Science

Standard A - Science as Inquiry

- Abilities necessary to do scientific inquiry
  - Ask questions about objects, organisms and events in the environment
- Understanding about scientific inquiry
  - Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.
  - Scientists use different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting).
  - Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.
  - Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.

Standard B - Physical Science

- Properties of Object and Materials
  - Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.
- Position and Motion of Objects
  - The position of an object can be described by locating it relative to another object or the background.

- An object's motion can be described by tracing and measuring its position over time.

Standard C – Life Sciences

- The Characteristics of Organisms
  - Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met. The world has many different environments, and distinct environments support the life of different types of organisms.
  - Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.
- Life Cycles of Organisms
  - Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. The details of this life cycle are different for different organisms.
  - Plants and animals closely resemble their parents.
- Organisms and Environments
  - All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.
  - An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.
  - All organisms cause changes in the environment where they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.

- Humans depend on their natural and constructed environments. Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms.

Standard D – Earth and Space Science

- Properties of Earth Materials
  - Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply

Standard E – Science and Technology

- Understanding About Science and Technology
  - People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
  - People have always had problems and invented tools and techniques (ways of doing something) to solve problems. Trying to determine the effects of solutions helps people avoid some new problems.
  - Scientists and engineers often work in teams with different individuals doing different things that contribute to the results. This understanding focuses primarily on teams working together and secondarily, on the combination of scientist and engineer teams.
  - Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technological work.
  - Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise see, measure, and do.

Standard F – Science in Personal and Social Perspectives

- Changes in Environments
  - Environments are the space, conditions, and factors that affect an individual's and a

population's ability to survive and their quality of life.
    - Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.

Standard G – History and Nature of Science

- Science as a Human Endeavor
    - Science and technology have been practiced by people for a long time.
    - Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.
    - Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.

Grades 5-8

Science

Standard A - Science as Inquiry

- Understanding about scientific inquiry
    - Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.
    - Current scientific knowledge and understanding guide scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding.

- Mathematics is important in all aspects of scientific inquiry.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.
- Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data. All of these results can lead to new investigations.

Standard C – Life Sciences

- Reproduction and Heredity
  - Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species.
- Regulation and Behavior
  - All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
  - An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species' evolutionary history.
- Populations and Ecosystems
  - A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
  - Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers--

they make their own food. All animals, including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.

- For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.

Standard E – Science and Technology

- Understanding About Science and Technology
  - Many different people in different cultures have made and continue to make contributions to science and technology.
  - Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed.
  - Technological designs have constraints.

Standard F – Science in Personal and Social Perspectives

- Populations, Resources and Environments
  - When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.
  - Causes of environmental degradation and resource depletion vary from region to region and from country to country.
- Science and Technology in Society

- Science influences society through its knowledge and world view.
- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
- Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.
- Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs.

Standard G – History and Nature of Science

- Science as a Human Endeavor
  - Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields. Some scientists work in teams, and some work alone, but all communicate extensively with others.
  - Science requires different abilities, depending on such factors as the field of study and type of inquiry.
- Nature of Science
  - Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.

Grades 9-12

Science

Standard A - Science as Inquiry

- Understanding about scientific inquiry

- Scientists usually inquire about how physical, living, or designed systems function.
- Scientists conduct investigations for a wide variety of reasons.
- Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.
- Mathematics is essential in scientific inquiry.

Standard C – Life Sciences

- Interdependence or Organisms
  - Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
- Matter, Energy and Organization in Living Systems
  - The distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials.

Standard E – Science and Technology

- Understanding About Science and Technology
  - Scientists in different disciplines ask different questions, use different methods of investigation, and accept different types of evidence to support their explanations. Many scientific investigations require the contributions of individuals from different disciplines, including engineering. New disciplines of science, such as geophysics and biochemistry often emerge at the interface of two older disciplines.
  - Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge. New technologies often extend the current levels of scientific understanding and introduce new areas of research.

- Creativity, imagination, and a good knowledge base are all required in the work of science and engineering.
- Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems.

Standard F – Science in Personal and Social Perspectives

- Population Growth
  - Populations grow or decline through the combined effects of births and deaths, and through emigration and immigration.
- Natural Resources
  - Human populations use resources in the environment in order to maintain and improve their existence.
  - The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.
- Science and Technology in Local, National and Global Challenges
  - Humans have a major effect on other species. For example, the influence of humans on other organisms occurs through land use (which decreases space available to other species), and pollution (which changes the chemical composition of air, soil, and water).